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(71) Applicant

Wabco Fahrzeugbremsen

GmbH (formerly Wabco

Westinghouse GmbH)

Postfach 91 12 80,

3000 Hannover 91

Federal Republic of

Germany

(72) Inventors

Werner Heger

Manfred Kramer

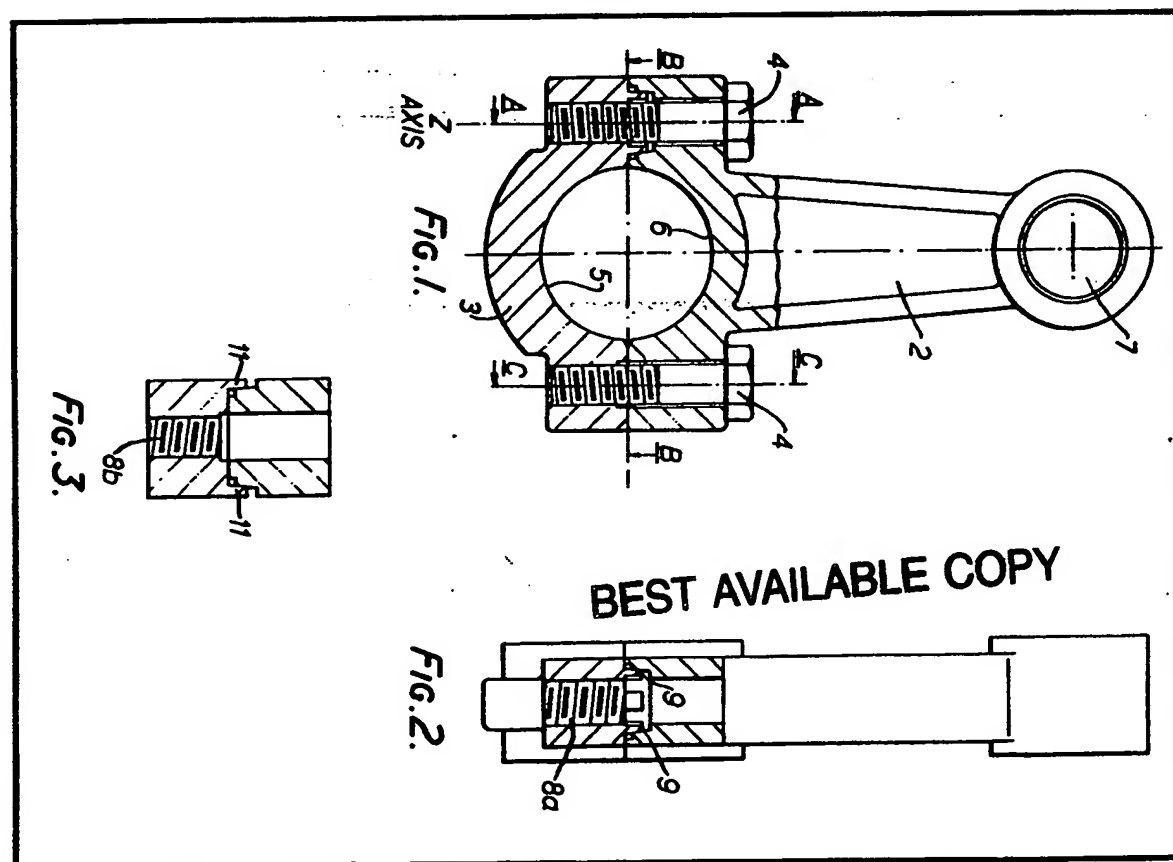
(74) Agents

Abel & Imray

(54) Alignment of bearing parts

(57) For centering halves of a divided bearing formed of die-cast parts there are provided centering members on each side of the bearing at the joint faces consisting of integrally cast tapered projections on one part and matching integrally cast tapered faces on the other part. On one side of the bearing the

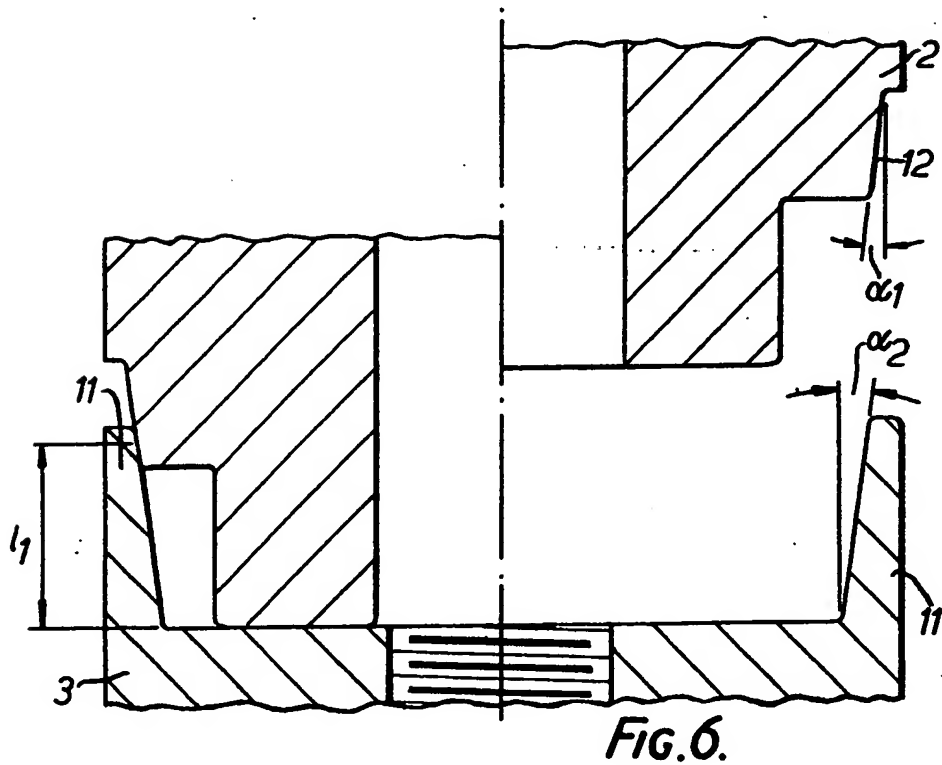
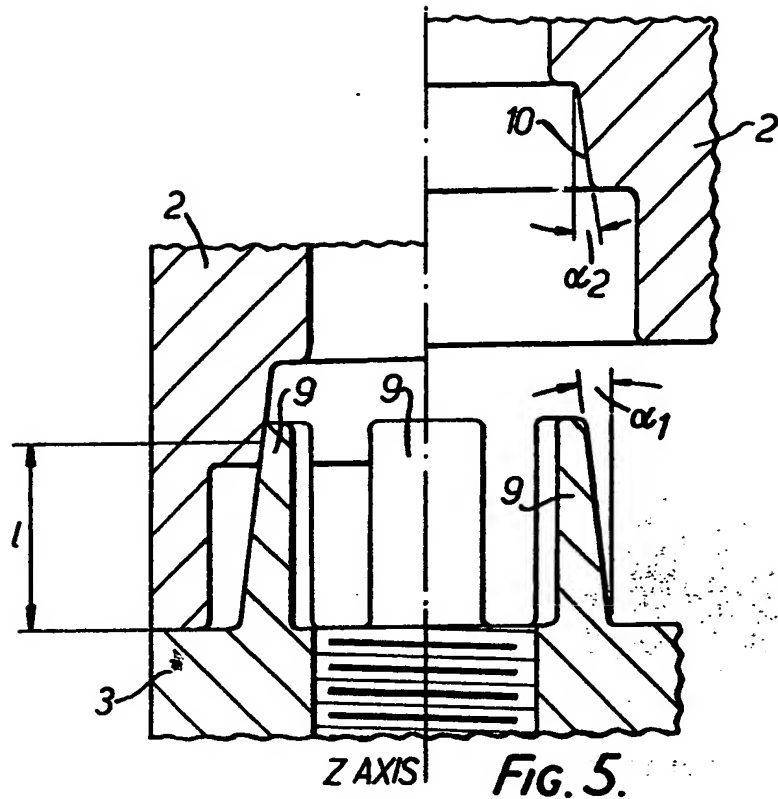
centering member 9 provides relative location of the two parts in all directions in the plane of the joint face but permits twisting of one part relative to the other, and on the other side of the bearing the centering member 11 provides relative location only in a direction parallel to the axis of the bearing. The projections may be arranged to be resiliently deformed by the pressure of the corresponding faces. The invention is described in its application to a split big-end bearing on a connecting rod.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

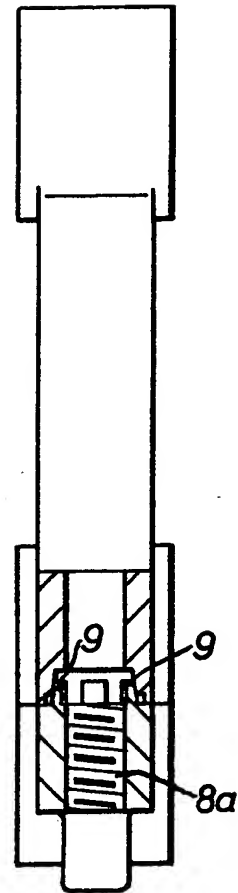
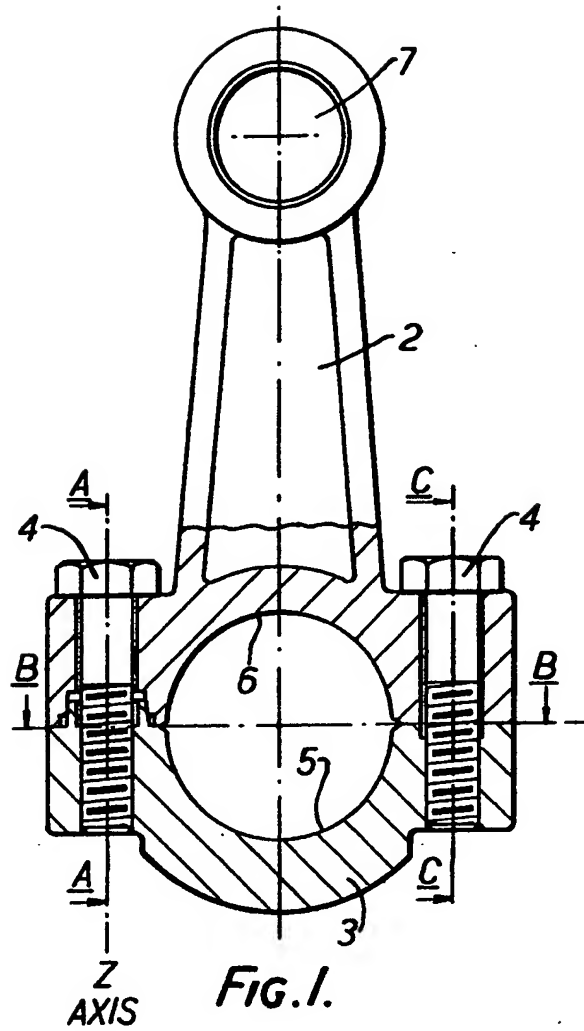
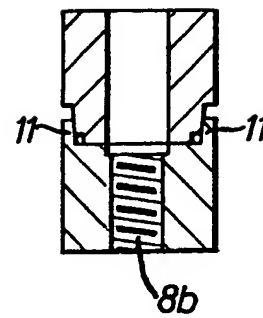
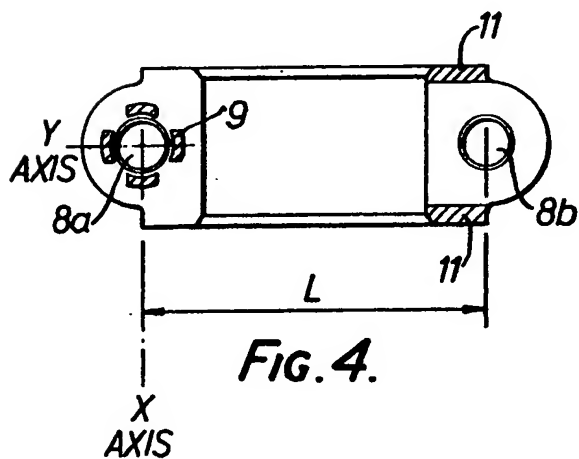
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**FIG. 2.****FIG. 3.**

## SPECIFICATION

## Improvements relating to the alignment of bearing parts

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The invention relates to the alignment of bearing parts and is particularly but not, exclusively suited to use with die-cast connecting rods having divided big ends.

- 10 Because the connecting rod has to be divided at its big end for the purpose of mounting it on a bearing journal of a crankshaft, it becomes necessary to align or centre the two parts of the connecting rod on the journal axis, and this centering is normally achieved by the use of tightly fitting bolts or by means of collars and adjusting pieces or recesses, which are formed by machining, in the two parts of the connecting rod, the bolts being used to hold the big end cap on the connecting rod.

- The use of tightly fitting bolts, however, presupposes very tight tolerances in the spacing between the bolts, so as to limit the play between the two parts of the connecting rod. On the other hand, centering by means of concentric recesses or by means of collars and adjusting pieces allows the two parts of the connecting rod to twist as far as is permitted by the play of the bolts, which can be limited only by incorporating bushes.

- In the case of the forged connecting rods, and even on die-cast connecting rods, centering as described above can be applied only with the aid of mechanical machining processes, which are undesirably expensive for mass production.

- An object of the present invention is to overcome the above difficulty. According to the present invention there is provided a die-cast component having a divided bearing for a shaft, the joint faces on both sides of the division at the bearing provided with centering members, wherein on each side of the bearing the centering member on the joint face of one part of the component includes one or more integrally cast tapered projections, and on the joint face of the other part of the component the centering member includes one or more cast-in tapered faces accommodating the projections.

- The invention in one example is concerned with the problem of producing a divided connecting rod, of which the joining faces of the two parts of the connecting rod which are formed to include centering members, are manufactured without any metal-cutting operations. The centering members must be such that after the bearing bore has been machined with the two parts together and the two parts have been separated for re-assembly on the journal, the parts can be assembled around the crankshaft bearing journal and bolted together again without misalignment due to play or needless duplication of centering effect, and in which twisting of the rod part relative to the big end cap is not possible.

Because the centering members in accordance with an example of the invention are shaped at the same time as the two parts of the connecting rod are being manufactured by die-casting there is no problem as regards cost in providing the centering members. An optimum relative location of the two parts in one example of the connecting rod is achieved in all planes by the tapering and possibly resilient construction of the centering projections and by the use of different kinds of centering near the two big end bolts, so that a twisting of the top part relative to the bottom part, resulting in a misalignment of the halves of the bearing, is impossible; at the same time the use of bearing bushes to keep the parts in alignment can be discontinued.

- 80 In order that the invention can be fully understood and readily carried into effect an example will now be described in detail below with reference to the drawings, of which:—  
Figure 1 shows partly in section a divided connecting rod, bolted together;  
Figure 2 shows the longitudinal section "A-A" of Fig. 1 through the centering member near one big end bolt;  
Figure 3 shows the longitudinal section "C-C" of Fig. 1 through the centering member near the other big end bolt;  
Figure 4 shows the cross-section "B-B" of Fig. 1 through the two centering members;  
Figure 5 shows on a larger scale a part of the centering member shown in Fig. 2;  
Figure 6 shows on a larger scale a part of the centering member shown in Fig. 3.

- The divided connecting rod 1 shown in Fig. 1 consists of a top part or body 2 and a bottom part or a big end cap 3, which are bolted together by big end bolts 4. The halves 5 and 6 of the bore are lined by bearing metal to form the bearing for a crankshaft pin and the upper nondivided bore 7 forms the bearing for the gudgeon pin.

- The views reproduced in Figs. 2, 4 and 5, partly in cut-out section, show that a centering member near one of the big end bolts consists of thin-walled, tapered projections 9 that are cast integrally with the bottom part of the connecting rod around a threaded bore 8a for one of the bolts 4 the axes of which passes through the intersection of X and Y axes (Fig. 4). The tapered projections 9 fit with an easy press fit against correspondingly tapered faces 10 in the top part 2 of the connecting rod when the top and bottom parts 2 and 3 are bolted together. The thickness of the projections 9 is so chosen in relation to their effective length  $l$  (Fig. 5) that they are slightly resiliently deformed by the pressure of the faces 10. The angles of taper  $\alpha_1$  and  $\alpha_2$  of the projections 9 and the faces 10 respectively are substantially equal.

- The centering member 9, 10 permits the

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parts 2 and 3 to twist relative to one another about the Z axis. To limit this freedom of twisting, near the other big end bolt 4, as shown in Figs. 3, 4 and 6, there are provided 5 thin-walled, likewise tapered projections 11 cast integrally with the lower part 3 and extending parallel to the Y axis. These projections 11 fit with an easy press fit against correspondingly tapered faces 12 in the upper 10 part 2 when the top and bottom parts, 2, 3 are bolted together. In this form of centering the projections 11 are also constructed to be bent resiliently by the pressure of the faces 12, the length  $l$  of the projections 11 in 15 relation to their thickness being selected to provide this effect. As with the other centering member the angles of taper  $\alpha_1$  and  $\alpha_2$  are equal.

In the centering members 9, 10 and 11, 20 12 it should be noted that only the tips of the projections 9 and 11 fit against the respective faces 10 and 12.

The form of centering of the one part of the connecting rod on the other just described 25 permits a large tolerance in the distance  $L$  between the two big end bolts 4 or their respective bores 8a and 8b, without a corresponding error in alignment. In addition, this particular form of centering can also be used 30 wherever die-cast parts are to be joined together free from play, e.g. when joining parts of crankcases, gearbox housings, the joint faces of which lie in the plane of a shaft axis, or when mounting crankshaft bearing caps on 35 a crankcase.

#### CLAIMS

1. A die-cast component having a divided bearing for a shaft, the joint faces on both 40 sides of the division at the bearing provided with centering members, wherein on each side of the bearing the centering member on the joint face of one part of the component includes one or more integrally cast tapered 45 projections, and on the joint face of the other part of the component the centering member includes one or more cast-in tapered faces accommodating the projections.

2. A component according to claim 1, 50 wherein the projection or projections and corresponding face or faces on one side of the bearing are concentric to a bore for a clamping bolt for the divided bearing and the projection or projections and the corresponding 55 face or faces on the other side of the bearing extend parallel to a plane perpendicular to the axis of the bearing.

3. A component according to claim 1 or 2, wherein the tapered projections are of such 60 a thickness as to be resiliently deformable by pressure of the corresponding faces when the component is assembled.

4. A component according to claim 1 or 2, wherein the angle of the tapered projections matches the angle of the respective

faces.

5. A component according to any of claims 1 to 4, wherein the tapered faces are so constructed that in the assembled state of 70 the component only portions of the tapered projections towards the tips thereof are in light pressure contact with the respective tapered faces.

6. A component according to any preceding 75 claim in the form of a connecting rod having a divided big end bearing clamped by two big end bolts one on each side of the bearing.

7. A die-cast connecting rod substantially 80 as described herein with reference to the accompanying drawings.

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